

APPENDIX A

ENGINEERING APPENDIX

ATTACHMENT C Resistivity Report

PART 1

Jacksonville Harbor Navigation Study, Duval County,
Florida

DRAFT
INTEGRATED GENERAL REEVALUATION
REPORT II AND SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT

**** FINAL REPORT ****



A-E SERVICES FOR CORE DRILLING AND LABORATORY TESTING OF JACKSONVILLE HARBOR DEEPENING GENERAL REEVALUATION REPORT (GRR) DUVAL COUNTY, FLORIDA

MAY 2010

CONTRACT NO.: W912EP-05-D-0010-0023

SPECIALIZING IN SOILS
EXPLORATION, PHYSICAL
TESTING, ENGINEERING AND
NDT EXAMINATION SERVICES



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FINAL REPORT
CORE BORINGS AND
LABORATORY TESTING
DUVAL COUNTY, FLORIDA

JACKSONVILLE HARBOR
FLORIDA GRR DEEPENING
PROJECT

MAY 2010
Contract # W912EP-05-D-0010
Delivery Order # 0023

Prepared For:
U.S. Army Corps of Engineers – Jacksonville District
Geotechnical Branch
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TABLE OF CONTENTS

JACKSONVILLE HARBOR FLORIDA GRR DEEPENING PROJECT

I. GEOTECHNICAL INVESTIGATION REPORT

- Purpose of Project
- Scope of Work
- Procedures & Project Specifications
- Field Work Performed
 - Phase I: Marine Core Boring Program
 - Phase II: Laboratory Testing
- Report Submittals
- Field Exploration Summary
- Conclusions
- Report Investigation Limitations

II. REFERENCE PROJECT PHOTOGRAPHS

III. CORE BORING LOCATION MAPS

- Master Layout of Project
- Borings CB-JHPM09-20 to CB-JHPM09-34
- Borings CB-JHPM09-10 to CB-JHPM09-19
- Borings CB-JHPM09-01 to CB-JHPM09-50
- Borings CB-JHPM09-35 to CB-JHPM09-40
- Borings CB-JHPM09-36 to CB-JHPM09-48

IV. MARINE SOILS TEST CORE BORINGS

- gINT Core Boring Logs
- Laboratory Curves - Grain Size Distribution
- Suspended Sedimentation Tests
- Reference Sample Photographs

V. UNCONFINED COMPRESSIVE STRENGTH TEST OF ROCK CORES

VI. LABORATORY TESTING SUMMARY RESULTS

VI. CORE BOX INVENTORY & PHOTOGRAPHS

- Gint Core Box Inventory
- Photographs of Contents from Each Core Box

PURPOSE OF PROJECT

The Jacksonville Harbor Florida General Reevaluation Report (GRR) envisions various new additions and features to the Jacksonville Harbor. This project is located in the Northeast corner of Florida in Duval County within the St. John's River.

This project was established to investigate the geologic conditions expected to be encountered during channel improvements by deepening, increasing the size of the turning basins, improvement of the jetties and breakwaters, wideners, docking and disposal areas of the ship channel.

Geology at depths to -60.0 feet Mean Lower Low Water (mllw) is requested to be provided for the purpose of future improvements along the Jacksonville Harbor Ship Channel.

This project consisted of performing fifty (50) marine geotechnical core borings and laboratory testing of designated samples in the Jacksonville Ship Channel from the entrance of the Harbor at Mayport upstream approximately twenty (20) miles to the Talleyrand Terminal.

Marine borings were requested to be performed in designated test locations in the Ship Channel spaced approximately two thousand (2000) feet apart.

SCOPE OF WORK

The scope of work in this task order assignment pertains to investigations performed along the St. John's River in the Jacksonville Harbor.

The required work in this assignment consisted of the following:

- A. **Marine Soils/Rock Core Borings:** Perform fifty (50) borings to be continuously splitspoon sampled in sediments and four (4) inch coring in rock to termination depths of a minimum -60.0 ft. mllw.
- B. **Laboratory Testing:** Designated samples were selected and tested in accordance with Corps of Engineers standards.
 - 1. Sieve Analyses
 - 2. Visual Percent Shell
 - 3. Laboratory Suspended Sedimentation Rates
 - 4. Unconfined Compressive Strength Tests of Rock Cores

Authorization to proceed with the requested tasks was issued on **July 30, 2009**
Contract #W912EP-05-0010 – Delivery Order #0023 by the U.S. Army Corps of Engineers – Jacksonville District.

PROCEDURES AND PROJECT SPECIFICATIONS

This report presents the procedures as followed for the borehole location, soil sampling, laboratory analyses and the classification of each respective soil sample in conjunction with special notes as recorded regarding conditions encountered in the field.

U.S. Army Corps of Engineer Standard Boring Log Forms 1836 are completed for each core boring performed in the designated location as generated with the Geotechnical Integrator "gINT" Software Program and script/library files as furnished by the Jacksonville District.

Drilling techniques and equipment were in general accordance with the prescribed technical provisions as stated in the Department of the Army Engineering Manual EM-1110-2-1907, "Soil Sampling" Publication.

FIELD WORK PERFORMED

PHASE I: MARINE CORE BORING PROGRAM

The field core boring phase of work on this project consisted of performing fifty (50) marine test borings in the existing Jacksonville Harbor Ship Channel - St. John's River near Jacksonville, Florida.

The core boring and sampling program was performed in a partnership with AMDRILL, Inc. of Orlando, Florida from a steel spud deck barge equipped with a center moonpool and support tugboat.

Two (2) separate mobilizations were conducted on this project, each using similar floating plants. The marine platform was a steel work barge owned by MOBRO Marine, "MB 54 & 55", each 30 ft. in beam x 60 ft. in length equipped with hydraulically operated seventy (70) foot steel spuds fourteen (14) inch diameter. The barge was pushed into position by support tugboats, M/V Diane & M/V Jamie Lynn, twin engine 42 ft. vessels, operated by a full time U.S.C.G. licensed Captain and deckhand.

The work deck was setup to accommodate a diesel powered hydraulic winch to raise/lower the spuds into position. A truck mounted drillrig was secured to the steel deck barge allowing work to be conducted through the twelve (12) inch moon pool.

The drillrig used on this project was a **Diedrich D-50** diesel powered truck mounted hydraulic unit equipped with a standard manual 140 lb. splitspoon drive hammer and series of wire winches. The pump attached to the rig was a Moyno 3L6 reciprocating cavity unit.

The advance of the borehole sampling on this project was accomplished using the mud rotary technique. A series of carbide tipped & tri-cone roller bits were used to clean out the borehole between splitspoon sampling events. When refusal was met and rock confirmed, an impregnated diamond tipped 4" x 5 ½" double tubed core barrel utilized.

In most cases, when coring was performed, the barrel was advanced five (5) feet for each run. At the completion of each core run, the barrel was removed from the borehole and brought to the surface. The core sample was removed from the barrel, photographed, logged and placed in wooden sample boxes.

The corrected water depths ranged from -18.4 feet to -49.7 feet of water on this project. Several of the borings were located in areas proposed to be widened which were noted to be in shallow water locations.

The tidal currents in the St. John's River were very strong. When the tide cycle changed, the surface waters continued to flow strongly for approximately two (2) hours, slack for a short period of time then reversing direction from ebb to flood or flood to ebb.

Six (6") inch diameter flush joint steel casing was advanced and seated into the river bottom to provide drill fluid continuity from the mudline to the mud pit located on the deck.

Splitspoon soils sampling (1 3/8" ID x 2" OD x 24" Length Tube) was conducted on a continuous basis (1.5 ft. intervals) to termination depths of a minimum of -60 ft. mllw with penetration resistance recorded from the blows of the standard 140 lb. SPT hammer on 6" intervals.

When refusal was met with the splitspoon and confirmed to be in rock, the borehole was reamed to 5 ¾" and the 4" x 5 ½" double tubed 5 ft. core barrel was inserted in the borehole to commence rock core drilling. A diamond impregnated surface set bit was used on the bottom of the core barrel.

This procedure was followed until termination depth was reached or a change in subsurface materials facilitated the need to resume splitspoon sampling.

Prior to mobilization, the U.S. Coast Guard and the St. John's River Bar Pilots were notified of our intentions to work within their jurisdiction for the period of time to conduct the field sampling & survey services.

We were in constant contact by VHF radio and/or telephone with St. John's Bar Pilots, approaching ships, Blount Island Security, large commercial vessels and barges to advise of our work intentions, locations and transmit marine advisories.

A marker buoy was dropped over each test location from the support boat. The barge was positioned and spuds lowered. Confirmation was made to verify each test location.



Steel Deck Barge, Spuds, Drillrig & Support Tugboat

Once the vessel was in position, the spuds were lowered to the bottom. At each boring location, the GPS position recorded over the moonpool and confirmed with the specified coordinates. A calibrated electronic fathometer was inserted into the moonpool to record actual river water depths. Tide gage readings to mllw were noted at the nearest reference station and corrected water depths were computed.

At each boring location, a calculation was performed to determine the elevation at the top of the bottom (mudline) and the required drill depth to meet the project minimum termination depth of -60.0 ft. mllw.

The field sampling on this project was conducted in two phases after receiving the official notice to proceed.

Work was authorized to start on the outer ten (10) core borings near the Mayport Naval Station and proceed up the St. John's River toward Jacksonville.

This work was conducted in August of 2009 before the peak of hurricane season, strong cold fronts began to push south and potential sea swells would affect a floating work platform near the entrance of the Harbor.

The remainder of the field work was placed on hold until a geophysical resistivity study as conducted by DEMCO, Inc. in the Fall of 2009 was performed. A meeting was held in Jacksonville on November 19th, 2009 to discuss the findings from the resistivity study and coordinate the remaining work to be conducted during the geotechnical phase of this project.

The purpose of the resistivity study was to identify the subsurface geological conditions as they existed in the ship channel and allow the Jacksonville District the opportunity to place the core borings in designated test areas to confirm and correlate resistivity findings.

Following review of the geophysical data, a revised set of core boring locations were received from the Jacksonville District and the project field work was resumed in January, 2010.

A summary of the computed horizontal coordinates for each of the test core borings to Florida East – NAD 83 State Plane Coordinates and vertical elevations to mean lower low water (mllw) is reported as follows:

MARINE TEST CORE BORING LOCATIONS

Boring Number	NAD 83	Florida East	Elevation Top of Bottom (MLLW)	Termination Depth MLLW (Ft)
	X	Y		
CB-JHPM09-1	472150	2208196	-45.1	-63.1
CB-JHPM09-2	473752	2207242	-41.4	-63.6
CB-JHPM09-3	475095	2205811	-39.1	-62.6
CB-JHPM09-4	476063	2203939	-41.0	-63.5
CB-JHPM09-5	477878	2202250	-43.4	-63.7
CB-JHPM09-6	479149	2201007	-45.0	-63.8
CB-JHPM09-7	480987	2200720	-44.8	-63.4
CB-JHPM09-8	482338	2200810	-45.6	-62.9
CB-JHPM09-9	487318	2201495	-43.0	-63.0
CB-JHPM09-10	486647	2200722	-18.9	-60.9
CB-JHPM09-11	488659	2201799	-45.1	-64.9
CB-JH0M09-12	490672	2201783	-44.0	-63.9
CB-JHPM09-13	492489	2202538	-49.7	-64.7
CB-JHPM09-14	494732	2202376	-42.4	-61.3
CB-JHPM09-15	497199	2203050	-31.1	-62.6
CB-JHPM09-16	498983	2202272	-42.9	-64.3
CB-JHPM09-17	500552	2201768	-44.4	-65.9
CB-JHPM09-18	502018	2203023	-44.1	-62.6
CB-JHPM09-19	503819	2203743	-45.9	-63.8
CB-JHPM09-20	506734	2203513	-43.6	-64.6
CB-JHPM09-21	507874	2202216	-42.4	-63.4

Boring Number	NAD 83 X	Florida East Y	Elevation Top of Bottom (MLLW)	Termination Depth MLLW (Ft)
CB-JHPM09-22	509269	2201526	-44.3	-63.8
CB-JHPM09-23	511076	2200149	-43.9	-62.4
CB-JHPM09-24	512584	2198802	-43.5	-64.5
CB-JHPM09-25	514028	2198355	-48.2	-60.5
CB-JHPM09-26	516172	2199461	-40.6	-61.6
CB-JHPM09-27	518015	2200448	-49.4	-62.9
CB-JHPM09-28	518631	2202355	-45.9	-62.4
CB-JHPM09-29	519910	2203897	-46.3	-61.3
CB-JHPM09-30	520152	2205593	-45.1	-61.6
CB-JHPM09-31	522200	2206760	-46.6	-61.6
CB-JHPM09-32	524075	2206438	-43.5	-61.5
CB-JHPM09-33	526130	2206770	-49.2	-61.2
CB-JHPM09-34	527920	2206000	-42.9	-62.4
CB-JHPM09-35	459932	2204315	-45.7	-64.0
CB-JHPM09-36	462062	2191979	-34.4	-64.4
CB-JHPM09-37	464768	2207392	-36.9	-62.5
CB-JHMP09-38	462438	2206041	-43.0	-67.0
CB-JHMP09-39	466081	2208167	-42.4	-61.9
CB-JHPM09-40	469922	2210183	-46.7	-63.7
CB-JHPM09-41	468160	2209835	-47.8	-65.8
CB-JHPM09-42	482007	2201958	-39.8	-62.4
CB-JHMP09-43	482520	2203652	-40.2	-62.6
CB-JHPM09-44	482897	2205651	-40.1	-62.6
CB-JHPM09-45	483557	2207212	-42.8	-62.8
CB-JHPM09-46	483768	2208532	-40.5	-60.5
CB-JHPM09-47	461739	2191503	-40.8	-64.8
CB-JHPM09-48	462024	2190774	-37.0	-62.9
CB-JHPM09-49	497614	2201897	-44.7	-62.3
CB-JHPM09-50	484628	2200417	-18.4	-63.7

All samples were visually classified in the field according to the Unified Soils Classification System (USCS).

PHASE II: LABORATORY TESTING

The samples were delivered to the office of Challenge Engineering & Testing, Inc. following the completion of the field work in mid-February, 2010. Each of the core bores were reviewed with the hand written logs and notes recorded in the field. Photographs were taken of each of the thirty three (33) wooden boxes containing the samples and are included in this report.

Preliminary draft boring logs were prepared, printed and submitted to the Jacksonville District for review. A spreadsheet summary of water depths, tidal corrections, corrected water elevations, rock core lengths and termination depths were included.

After review, laboratory testing of designated samples and rock cores were assigned by the Geotechnical Branch of the Jacksonville District.

The following number of samples were assigned for laboratory analyses:

Grain Size Samples ASTM D 422 - 23 Each
Visual Percent Shell - 23 Each
Carbonate Content ASTM D 4373 - 8 Each
Suspended Sedimentation Test – 16 Each
Unconfined Compressive Strength Test – 19 Each

The following sieve sizes were used in the grain size determinations as specified for this project: Sieves 3/4", 3/8", # 4, # 10, # 20, # 40, # 60, # 100 & # 200.

Water was collected from the St. John's River for the suspended sedimentation tests.

The results for each of the tests performed are reported on the respective gInt core boring logs, grain size distribution report, suspended sedimentation test reports and in the Laboratory Test Summary (Part VI)

Grain size distribution curves are reported and plotted on Form 2087 for each assigned core boring.

REPORT SUBMITTALS

The field boring logs, visual classifications and laboratory test results were all entered into the Geotechnical Integrator (gINT) software format as designed by the Jacksonville District which is presented as part of this report.

Digital photographs were taken of every SPT sample recovered and core run performed on this project.

A pre-printed erasable marker board was prepared to be used in the photograph of each splitspoon sample while in the tube. The rock cores for each run were placed on the deck of the barge with a scale and labeled project marker board. The camera was held in the same general position to provide a repeatable constant photograph of each sample.

The reference sample photographs are included in this report following each respective core boring log.

The laboratory results for grain size analyses and compressive strength tests are reported in the note section on the gINT boring logs.

Photographs were taken of each completed core box and an inventory of samples as prepared in the gInt format is included.

The core boxes were delivered to the Corps of Engineer Warehouse on Talleyrand Avenue in Jacksonville, Florida on April 11, 2010 and received by Mr. Mark Whitson of the Jacksonville District.

An electronic .pdf file of this entire report was prepared to include all photographs, boring logs and laboratory tests for future reproduction and presentation.

FIELD EXPLORATION SUMMARY

The field work on this project was started in August Of 2009 near the entrance to the Jacksonville Harbor at Mayport on the St. John's River. The borings were conducted in sequence working up river toward the Talleyrand Terminal near downtown Jacksonville, Florida in February, 2010.

Splitspoon sampling was performed on each of the borings until refusal was confirmed into rock. Cemented sand and shell was noted in many of the borings, which generated higher blow counts.

Several instances, a decision was made in the field to continue splitspoon sampling when refusal was encountered, as the material appeared to be strongly cemented sand and shell.

When a core of the material was taken, lenses of soft to hard limestone were indicated with soft sandy and shelly/sand layers which filled the pitted and porous limestone.

Compressive strength tests in the laboratory were performed on many of the cores to confirm this description which ranged in strength from 60 to 5728 psi. Each of the borings was terminated at a minimum elevation below -60.0 ft. mllw.

Some debris was encountered on several of the borings during setup, advancement of the casing and during sampling operations. Areas of noted debris on bottom included CB-JHPM09-23 (south of the shipyard), CB-JHPM09-28 and various areas around the Blount Island Terminal.

The area east of the Talleyrand Terminal was noted to be very soft to firm sand and silt to termination depths with no rock encountered.



**Steel Bar Encrusted In Cemented Sand/Limestone 1.5 ft.
Below Mudline at CB-JHPM09-28**

The limestone encountered on this project was layered, noted to be hard to soft in areas with cemented sand and shell. Core recovery was good in those areas which contained competent rock to include the sand lenses.

CONCLUSION

Marine traffic in the Jacksonville Harbor Entrance and St. John's River Channel was noted to be heavy with strong tidal currents.

In many instances, ships would pass side to side in the narrow channel, not allowing much additional room to maneuver in or near the channel for any other traffic or vessel.

The sediments encountered consisted primarily of loose to firm silts, shell & sands in many locations into layered soft to hard limestone rock.

Each section should be evaluated individually for dredge suitability purposes. Some of the cuts revealed loose sands and shells to termination depths of -60 ft. mllw while others indicated loose materials in the upper portion of the boring followed by intermittent layers of stiff clay or rock which required coring.

These highly variable soils and limestone rock will potentially impact dredging operations requiring the use of special equipment and cutter heads. The clay may cause restrictions within the dredge line or complete clogging of the pump.

Much of the limestone encountered was soft to hard, white to gray in color, with clay, sand and shell, pitted to porous & slightly weathered in appearance. The rock was noted to be layered in relative hardness.

Dredging contractors should be prepared to cut the subsurface rock and very stiff clays in each respective cut, if encountered.

REPORT INVESTIGATION LIMITATIONS

The core borings and analyses submitted in this conceptual report are based on the data obtained from the field explorations performed at the locations depicted on the site plan.

These locations were chosen by the U.S. Army Corps of Engineers, Jacksonville District. The area explored is limited to the depth and diameter of the core borings. This report does not reflect any variations which may occur adjacent to or between the core borings.

The nature and extent of the variations between the borings may not become evident until during dredging or construction. If variations then appear evident, it will be necessary to re-evaluate the information presented in this report after performing additional explorations and noting the characteristics of the variations.

This report is based on relatively shallow explorations and a scope of work determined solely by the Corps of Engineers. This report does not include an evaluation of the environmental (ecological or hazardous/toxic material related) condition of the site and subsurface.

This report has been prepared for the exclusive use of the U.S. Army Corps of Engineers in accordance with generally accepted soil exploration engineering practices.

It has been our pleasure for Challenge Engineering & Testing, Inc. to provide the U.S. Army Corps of Engineers – Jacksonville District our geotechnical engineering testing services on this project.

I trust that you will find this report submittal to be in general conformance with the project guidelines and specifications.

Respectfully Submitted,
Challenge Engineering & Testing, Inc.

V. J. Thompson III, P.E.
Project Engineer
Florida Registration # 37610

JACKSONVILLE HARBOR GRR PROJECT

ST. JOHN'S RIVER, FLORIDA

BORING NUMBER	TEST DRILL LOCATION		WATER DEPTH (FT)	TIDE GAUGE (FT)	CORRECTED		SAMPLE DEPTH (FT)	TERMINATION DEPTH (MLLW)	SAMPLING PERFORMED (FT)		
	X (EASTING)	Y (NORTHING)			WATER	DEPTH (FT)			SPT SAMPLING	4" X 5 1/2" CORING	6" CASING INSTALLED
CB-JHPM09-1	472150	2208196	-47.5	2.4	-45.1		18.0	-63.1	18.0	0.0	57.5
CB-JHPM09-2	473752	2207242	-41.4	0.0	-41.4		22.2	-63.6	11.2	11.0	54.5
CB-JHPM09-3	475095	2205811	-40.0	0.9	-39.1		23.5	-62.6	13.5	10.0	50.5
CB-JHPM09-4	476063	2203939	-44.3	3.3	-41.0		22.5	-63.5	22.5	0.0	55.5
CB-JHPM09-5	477878	2202250	-43.7	0.3	-43.4		20.3	-63.7	15.3	5.0	52.5
CB-JHPM09-6	479149	2201007	-47.7	2.7	-45.0		18.8	-63.8	2.3	16.5	54.5
CB-JHPM09-7	480987	2200720	-46.2	1.4	-44.8		18.6	-63.4	3.1	15.5	54.5
CB-JHPM08-8	482338	2200810	-47.7	2.1	-45.6		17.3	-62.9	11.6	5.5	57.5
CB-JHPM09-9	487318	2201495	-43.8	0.8	-43.0		20.0	-63.0	15.0	5.0	50.5
CB-JHPM09-10	486647	2200722	-19.6	0.7	-18.9		42.0	-60.9	42.0	0.0	35.5
CB-JHPM09-11	488659	2201799	-47.2	2.1	-45.1		19.8	-64.9	14.3	5.5	55.5
CB-JHPM09-12	490672	2201783	-45.2	1.2	-44.0		19.9	-63.9	19.9	0.0	55.5
CB-JHPM09-13	492489	2202538	-51.4	1.7	-49.7		15.0	-64.7	15.0	0.0	59.5
CB-JHPM09-14	494732	2202376	-45.6	3.2	-42.4		18.9	-61.3	18.9	0.0	54.5
CB-JHPM09-15	497199	2203050	-34.6	3.5	-31.1		31.5	-62.6	31.5	0.0	42.5
CB-JHPM09-16	498983	2202272	-45.1	2.2	-42.9		21.4	-64.3	15.9	5.5	54.5
CB-JHPM09-17	500552	2201768	-47.5	3.1	-44.4		21.5	-65.9	16.5	5.0	55.5
CB-JHPM09-18	502018	2203023	-46.7	2.6	-44.1		18.5	-62.6	9.0	9.5	55.5
CB-JHPM09-19	503819	2203743	-48.9	3.0	-45.9		17.9	-63.8	9.9	8.0	55.5
CB-JHPM09-20	506734	2203513	-45.0	1.4	-43.6		21.0	-64.6	21.0	0.0	55.5
CB-JHPM09-21	507874	2202216	-46.1	3.7	-42.4		21.0	-63.4	21.0	0.0	55.5
CB-JHPM09-22	509269	2201526	-45.2	0.9	-44.3		19.5	-63.8	19.5	0.0	55.5
CB-JHPM09-23	511076	2200149	-45.8	1.9	-43.9		18.5	-62.4	18.5	0.0	55.5
CB-JHPM09-24	512584	2198802	-46.5	3.0	-43.5		21.0	-64.5	21.0	0.0	55.5
CB-JHPM09-25	514028	2198355	-50.0	1.8	-48.2		12.3	-60.5	12.3	0.0	56.5
CB-JHPM09-26	516172	2199461	-42.0	1.4	-40.6		21.0	-61.6	21.0	0.0	54.5
CB-JHPM09-27	518015	2200448	-53.3	3.9	-49.4		13.5	-62.9	13.5	0.0	60.5
CB-JHPM09-28	518631	2202355	-47.7	1.8	-45.9		16.5	-62.4	16.5	0.0	55.5
CB-JHPM09-29	519910	2203897	-47.8	1.5	-46.3		15.0	-61.3	15.0	0.0	55.5
CB-JHPM09-30	520152	2205593	-48.9	3.8	-45.1		16.5	-61.6	16.5	0.0	55.5
CB-JHPM09-31	522200	2206760	-47.8	1.2	-46.6		15.0	-61.6	15.0	0.0	55.5
CB-JHPM09-32	524075	2206438	-46.5	3.0	-43.5		18.0	-61.5	18.0	0.0	55.5
CB-JHPM09-33	526130	2206770	-50.4	1.2	-49.2		12.0	-61.2	12.0	0.0	60.5
CB-JHPM09-34	527920	2206000	-48.0	5.1	-42.9		19.5	-62.4	19.5	0.0	57.5
CB-JHPM09-35	459932	2204315	-48.1	2.4	-45.7		18.3	-64.0	4.3	14.0	57.5
CB-JHPM09-36	462062	2191979	-34.6	0.2	-34.4		30.0	-64.4	30.0	0.0	45.5
CB-JHPM09-37	464768	2207392	-39.5	2.6	-36.9		25.6	-62.5	25.6	0.0	54.5
CB-JHPM09-38	462438	2206041	-43.5	0.5	-43.0		24.0	-67.0	24.0	0.0	57.5
CB-JHPM09-39	466081	2208167	-45.0	2.6	-42.4		19.5	-61.9	10.5	9.0	55.5
CB-JHPM09-40	469922	2210183	-50.1	3.4	-46.7		17.0	-63.7	4.0	13.0	57.5
CB-JHPM09-41	468160	2209835	-49.7	1.9	-47.8		18.0	-65.8	18.0	0.0	64.5
CB-JHPM09-42	482007	2201958	-40.2	0.4	-39.8		22.6	-62.4	7.0	15.5	55.5
CB-JHPM09-43	482250	2203652	-43.8	3.6	-40.2		22.4	-62.6	22.4	0.0	57.5
CB-JHPM09-44	482897	2205651	-41.4	1.3	-40.1		22.5	-62.6	22.5	0.0	53.5
CB-JHPM09-45	483557	2207212	-44.8	2.0	-42.8		20.0	-62.8	9.5	10.5	55.5
CB-JHPM09-46	483768	2208532	-43.1	2.6	-40.5		20.0	-60.5	18.1	5.0	55.5
CB-JHPM09-47	461739	2191503	-43.6	2.8	-40.8		24.0	-64.8	24.0	0.0	52.5
CB-JHPM09-48	462024	2190774	-36.9	-0.1	-37.0		25.9	-62.9	25.9	0.0	50.5
CB-JHPM09-49	497614	2201897	-46.7	2.0	-44.7		17.6	-62.3	11.6	6.0	55.5
CB-JHPM09-50	484628	2200417	-19.1	0.7	-18.4		45.3	-63.7	40.3	5.0	65.5
TOTALS >>							1040.6		863.4	180.0	2750.0

REFERENCE PROJECT PHOTOGRAPHS



**MOBILIZATION OF MARINE EQUIPMENT AND CREW
WAS PERFORMED IN AUGUST OF 2009 FOR WORK
CONDUCTED IN THE ENTRANCE HARBOR AND
JANUARY 2010 FOR THE REMAINDER OF THE ST.
JOHN'S RIVER CHANNEL TOWARD TALLEYRAND**





70 FT. X 14" STEEL SPUDS WERE FABRICATED TO MAINTAIN POSITION IN THE DEEP WATERS OF THE ST. JOHN'S RIVER CHANNEL



THE SPUDS WERE INSTALLED AT THE ATLANTIC SHIPYARD INTO THE DECK BARGE WELLS. EACH WAS OPERATED BY A DIESEL POWERED WINCH SYSTEM



**CORE SAMPLES WERE LOGGED,
PHOTOGRAPHED AND PLACED INTO BOXES**



**WORK WAS CONDUCTED FROM STEEL DECK
BARGE EQUIPPED WITH A CENTER DRILL PORT,
70 FT. SPUDS AND PUSHED INTO POSITION BY A
TWIN ENGINE SUPPORT TUGBOAT**



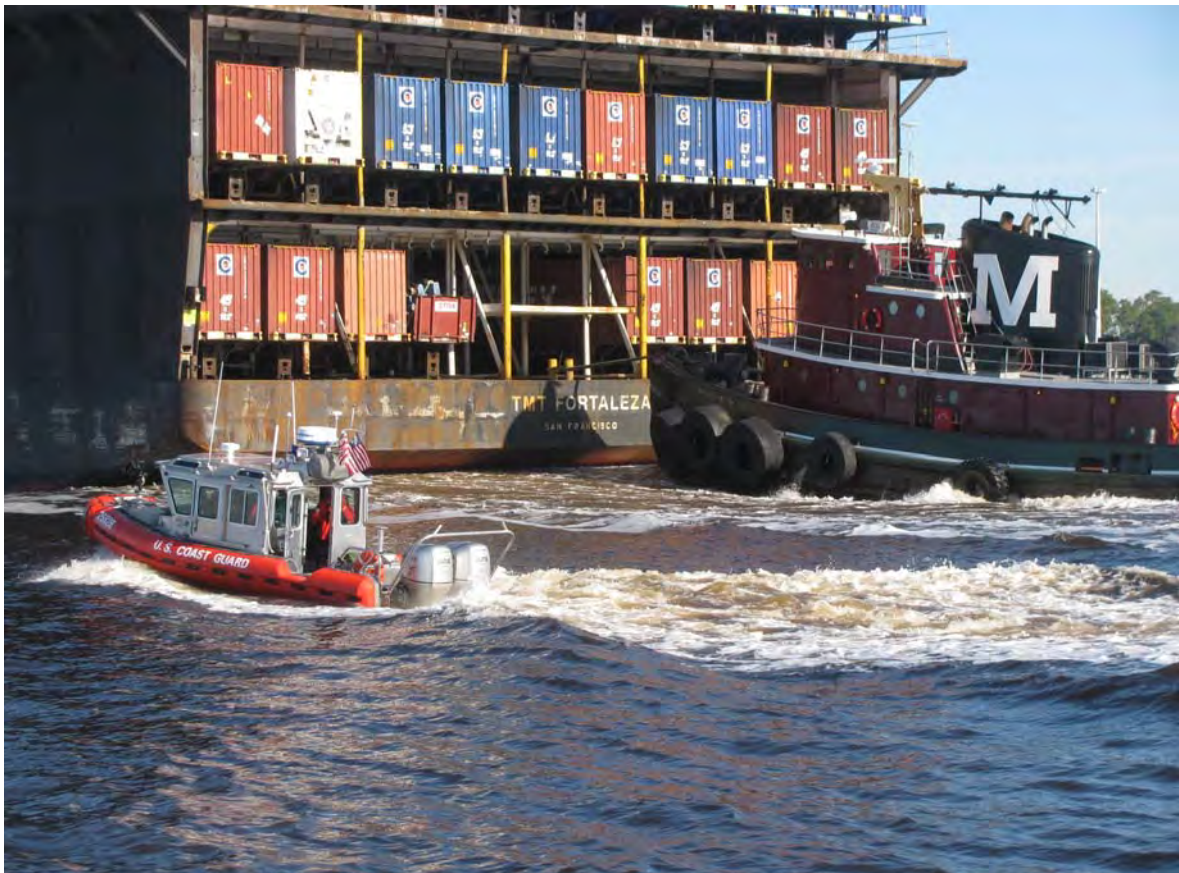
**BORINGS WERE LOCATED FROM
PRE-DETERMINED GPS POSITIONS IN THE
SHIP CHANNEL AND WIDENER AREAS**

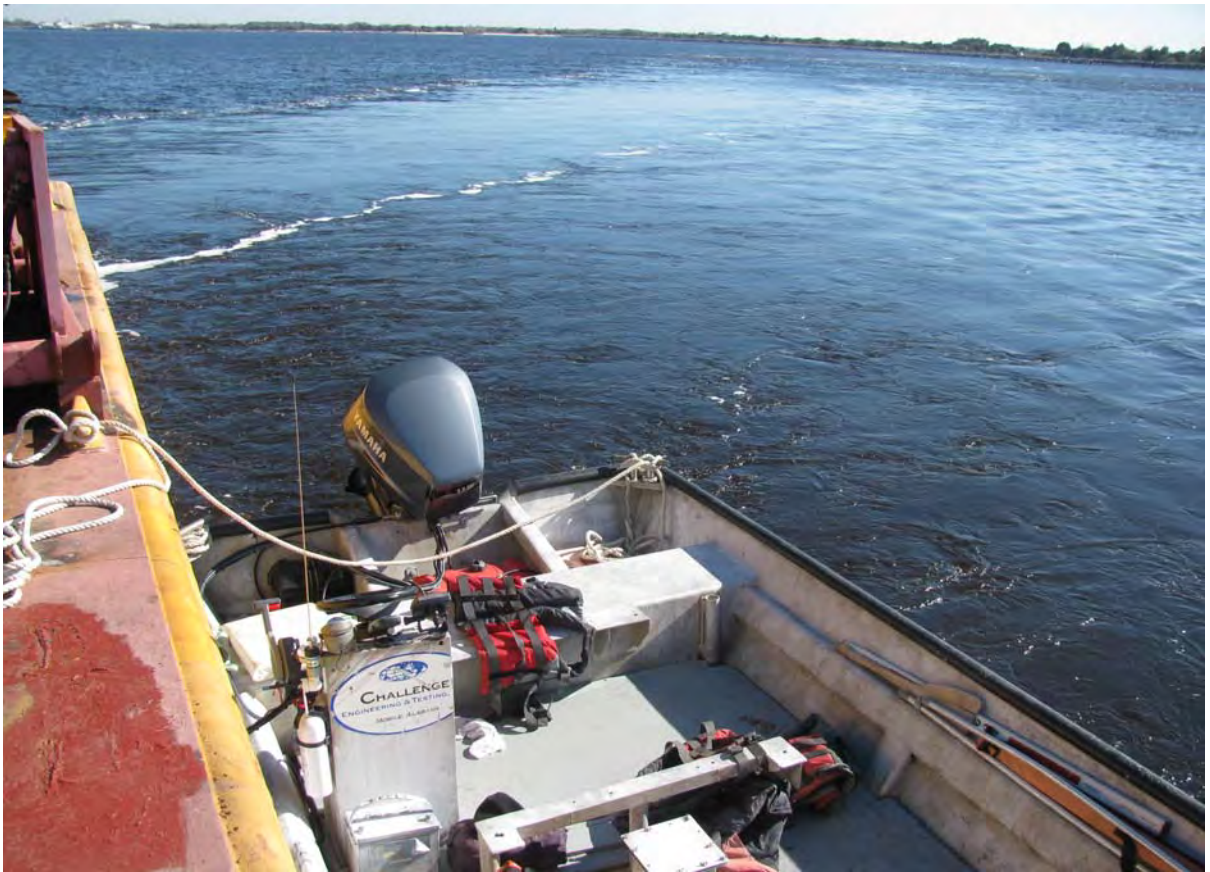


**WATER DEPTHS WERE RECORDED INSIDE THE
DRILL PORT WITH A CALIBRATED ELECTRONIC
UNIT AND CORRECTED TO MLLW**



COMMUNICATION WAS CRITICAL WITH THE ST. JOHN'S BAR PILOT STATION AND SHIP CAPTAINS DUE TO HEAVY VOLUME OF TRAFFIC WORKING THROUGHOUT THE JACKSONVILLE HARBOR





TIDAL CURRENTS WERE NOTED TO BE VERY STRONG AT TIMES WHILE SETUP IN THE ST. JOHN'S RIVER, ESPECIALLY NEAR THE FULL MOON



THE BARGE WAS POSITIONED AND STEEL CASING INSTALLED DURING "SLACK" WATER



PORT SECURITY FROM THE U.S. COAST GUARD, U.S. MARINE CORPS POLICE, BLOUNT ISLAND TERMINAL AND THE U.S. NAVY WERE INVOLVED WITH DRILLING OPERATIONS NEAR THEIR FACILITIES.





**THE CORE BORINGS WERE LOCATED WITHIN
THE ST. JOHN'S RIVER SHIP CHANNEL AND
PROPOSED WIDENER AREAS**



**SHIP TRAFFIC WAS NOTED TO BE HEAVY
WITH LARGE, DEEP DRAFT VESSELS
PASSING CLOSE TO TEST LOCATIONS**



**DRILLING OPERATIONS WERE CONDUCTED
THROUGH A MOONPOOL IN THE SPUD
MOUNTED DECK BARGE**



**THE MARINE BARGE, TUGBOAT AND DRILL
EQUIPMENT WERE MOVED FROM THE
ST. JOHN'S RIVER CHANNEL EACH EVENING
TO A SAFE HARBOR CLEAR OF TRAFFIC**



**CORING WAS PERFORMED WITH A
4" X 5 1/2" DOUBLE TUBE CORE BARREL**



**DRILLING WAS CONDUCTED USING A
DIEDRICH D-50 TRUCKMOUNTED DRILLRIG
AND 6" STEEL CASING**



SOME DEBRIS WAS ENCOUNTERED IN SEVERAL TEST LOCATIONS. CORING WAS INITIATED WHEN REFUSAL WAS ENCOUNTERED INTO THIS 3" STEEL BAR



COMMERCIAL DIVERS WERE REQUIRED WHEN CASING NEEDED TO BE RETRIEVED DUE TO STRONG RIVER CURRENTS AND DEEP DRAFT SHIP TRAFFIC DISPLACEMENT

CORE BORING LOCATION PLAN

Oct 8, 2008 2:54 pm

LOCATION OF TEST CORE BORINGS

JACKSONVILLE HARBOR GRR PROJECT

ST. JOHN'S RIVER, FLORIDA

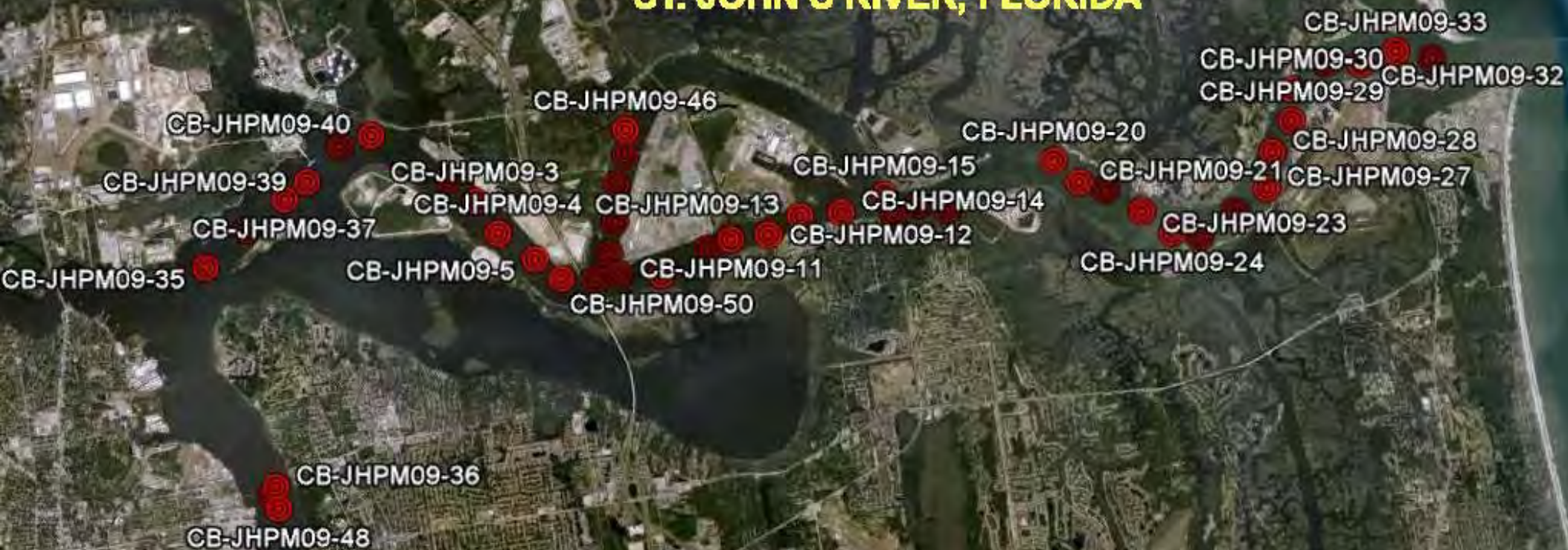


Image U.S. Geological Survey
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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Oct 8, 2008 2:54 pm

LOCATION OF CORE BORINGS

JACKSONVILLE HARBOR GRR PROJECT ST. JOHN'S RIVER, FLORIDA

N

CB-JHPM09-20

CP-JHPM09-21

CB-JHPM09-22

105

CB-JHPM09-23

CB-JHPM09-24

CB-JHPM09-25

CB-JHPM09-26

CB-JHPM09-27

CB-JHPM09-28

CB-JHPM09-29

CB-JHPM09-30

CB-JHPM09-31

CB-JHPM09-32

CB-JHPM09-33

CB-JHPM09-34

6540 ft

© 2010 Google
Image U.S. Geological Survey

Wonderwood Dr

Mayport Rd

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105

Blount Island

Heckscher Dr

CB-JHPM09-19

CB-JHPM09-15

Little Marsh Island

CB-JHPM09-18

CB-JHPM09-13

CB-JHPM09-16

CB-JHPM09-11

CB-JHPM09-14

CB-JHPM09-49

CB-JHPM09-17

Calypso Island

CB-JHPM09-10

CB-JHPM09-9

CB-JHPM09-12

Reed Island

LOCATION OF CORE BORINGS

JACKSONVILLE HARBOR GRR PROJECT

ST. JOHN'S RIVER, FLORIDA

Fort Caroline Rd

Monument Rd

Bird Island

5035 ft

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CB-JHPM09-1

CB-JHPM09-46

LOCATION OF CORE BORINGS

JACKSONVILLE HARBOR GRR PROJECT

ST. JOHN'S RIVER, FLORIDA

CB-JHPM09-2

CB-JHPM09-45

CB-JHPM09-3

CB-JHPM09-44

CB-JHPM09-4

CB-JHPM09-43

Crab Island

CB-JHPM09-5

CB-JHPM09-42

Bartram Island
Quarantine Island

William Island

CB-JHPM09-6

CB-JHPM09-8

Randolph Island

CB-JHPM09-7

CB-JHPM09-50

New Castle Island

Fip43231/d

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LOCATION OF CORE BORINGS

JACKSONVILLE HARBOR GRR PROJECT

ST. JOHN'S RIVER, FLORIDA

Heckscher Dr

105

CB-JHPM09-40

CB-JHPM09-41

CB-JHPM09-39

CB-JHPM09-37

CB-JHPM09-38

CB-JHPM09-35

Crab Island

William Island

Randolph Island

New Castle Island

Google
Fip Island

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University of
Florida

5024 ft

Buffalo Ave

Oct 8, 2008 2:54 pm

LOCATION OF CORE BORINGS

JACKSONVILLE HARBOR GRR PROJECT

ST. JOHN'S RIVER, FLORIDA

CB-JHPM09-36

CB-JHPM09-47

CB-JHPM09-48

E 23rd St

Bayland Ave

Blair St

E 19th St

Williams

E 18th St

1530 ft

Image U.S. Geological Survey
© 2010 Google

Google

TEST CORE BORING NUMBER
“CB-JHPM09-1”

gINT Boring Log
Laboratory Curves
Sample Photographs

Boring Designation CB-JHPM09-1

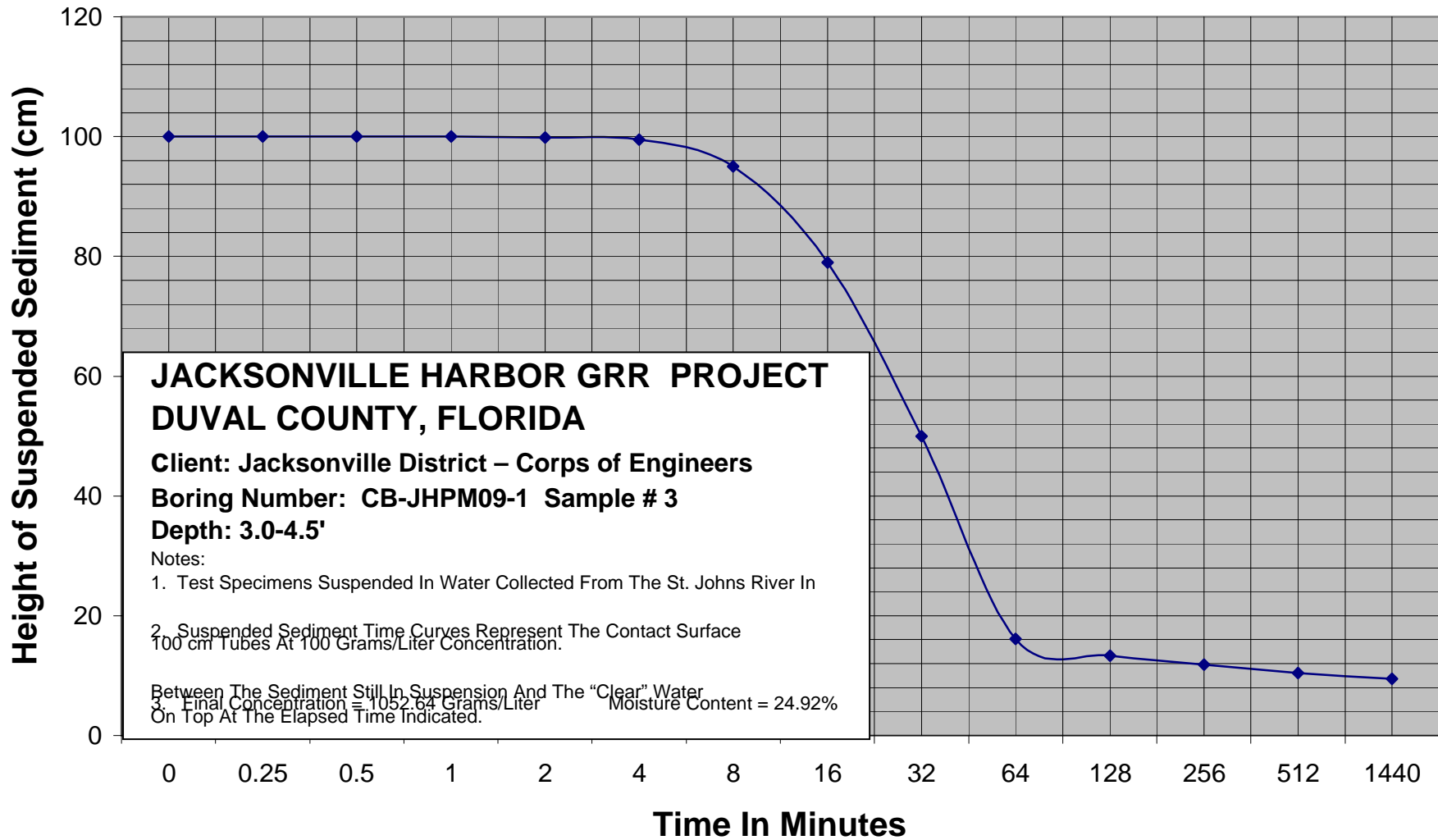
DRILLING LOG		DIVISION South Atlantic		INSTALLATION Jacksonville District			SHEET 1 OF 2 SHEETS	
1. PROJECT Jacksonville Harbor General Reevaluation Report (GRR) ST. JOHN'S RIVER CHANNEL				9. SIZE AND TYPE OF BIT See Remarks				
2. BORING DESIGNATION CB-JHPM09-1				10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83	VERTICAL MLLW	
3. DRILLING AGENCY Challenge Engineering & Testing, Inc.				11. MANUFACTURER'S DESIGNATION OF DRILL Diedrich D-50 Truckrig		<input type="checkbox"/> AUTO HAMMER <input checked="" type="checkbox"/> MANUAL HAMMER		
4. NAME OF DRILLER Tim Clarkson				12. TOTAL SAMPLES		DISTURBED 12	UNDISTURBED (UD) 0	
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED				13. TOTAL NUMBER CORE BOXES		1		
6. THICKNESS OF OVERBURDEN N/A				14. ELEVATION GROUND WATER		TIDAL		
7. DEPTH DRILLED INTO ROCK N/A				15. DATE BORING		STARTED 01-31-10	COMPLETED 01-31-10	
8. TOTAL DEPTH OF BORING 18.0 Ft.				16. ELEVATION TOP OF BORING		-45.1 Ft.		
				17. TOTAL RECOVERY FOR BORING		84 %		
				18. SIGNATURE AND TITLE OF INSPECTOR		V. J. Thompson III, Civil Engineer		

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RCD OR UD	REMARKS	BLOWS/0.5 FT.	N-VALUE		
-45.1	0.0		SILT, organic-L, nonplastic, very soft, few angular to subangular fine-grained sand-sized quartz, trace angular shell up to 1/4", wet, 5Y 2.5/1 black (OL)	53	1		-45.1	0	0		
							SPT Sampler	0			
							-46.6	0			
-47.1	2.0		SAND, silty, mostly fine to medium-grained sand-sized quartz, little silt, wet, 5Y 4/2 olive gray (SM) At El. -48.1 Ft., 5G 4/2 grayish green	67	2		SPT Sampler	1	5		
							-48.1	4			
								5			
-49.6	4.5	 Highly Weathered	LIMESTONE, sandy, sparsely fossiliferous, very soft, highly weathered, fine grained, 5Y 7/2 light gray	93	3		SPT Sampler	4	7		
							-49.6	3			
								7	16		
							-51.1	8			
								10			
						93	5		SPT Sampler	11	28
							-52.6	17			
						87	6		SPT Sampler	8	19
					-54.1	11					
				87	7		SPT Sampler	12	26		
					-55.6	14					
				53	8		SPT Sampler	5	5		
						2					
					-57.1	3					
-57.1	12.0		SAND, poorly-graded with silt, mostly angular to subangular fine to medium-grained sand-sized quartz, few silt, moist, 5Y 7/2 light gray (SP-SM)	100	9		SPT Sampler	9	33		
							-58.6	19			
								11			
				100	10		SPT Sampler	14	40		
					-60.1	26					

Boring Designation CB-JHPM09-1

<i>DRILLING LOG (Cont. Sheet)</i>			INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS			
PROJECT Jacksonville Harbor General Reevaluation Report (GRR)			COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83		VERTICAL MLLW		
LOCATION COORDINATES X = 472,150 Y = 2,208,196			ELEVATION TOP OF BORING -45.1 Ft.						
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-63.1	18.0		At El. -60.1 Ft., few angular to subangular shell up to 1/8"	100	11			10	29
							14		
						15			
			At El. -61.6 Ft., trace phosphate	100	12			18	60
				28					
							-63.1	32	
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Set 57.5 ft. of 6" flush joint steel casing 4. Water depth recorded at start of drilling operations and referenced to the tidal station at the Dames Point Bridge. 5. Water depth of -47.5 ft. recorded at 08:13 AM on 1/31/2010. Tide gage reading of +2.4 ft. mllw				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).		

SUSPENDED SEDIMENTATION TIME CURVE



JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 0.0'-1.5'

S-1

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 1.5' - 3.0'

S-2

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 3.0' - 4.5'

S-3

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 4.5'-6.0'

S-4

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 6.0-7.5'

S-5

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 7.5'-9.0'

S-6

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 9.0'-10.5'

S-7

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 10.5'-12.0'

S-8

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 12.0' 13.5'

S-9

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 13.5'-15.0'

S-10

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 15.0'-16.5'

S-11

JACKSONVILLE HARBOR GRR

CB-JHPM09-1

DEPTH: 16.5'-18.0'

S-12

TEST CORE BORING NUMBER
“CB-JHPM09-2”

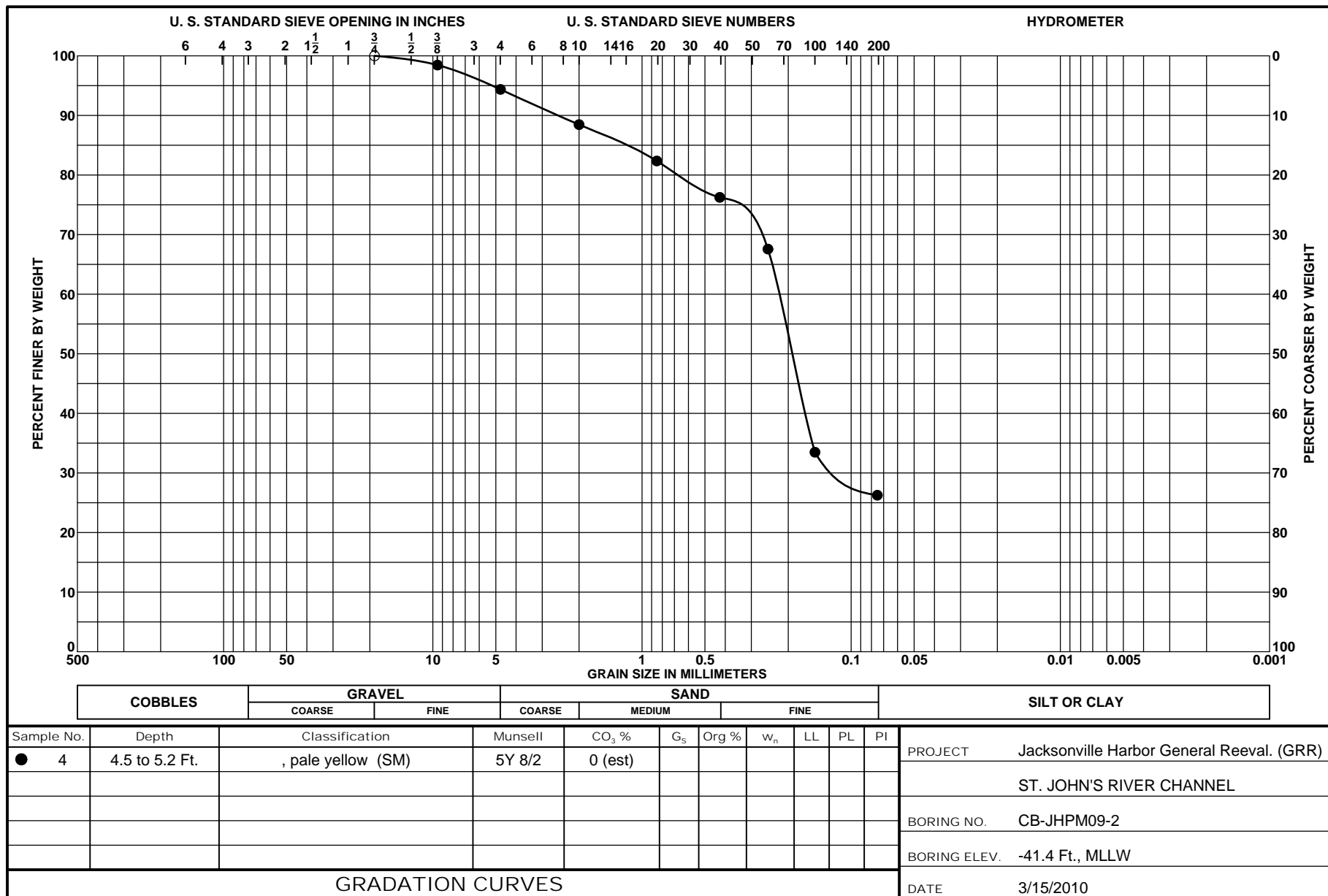
gINT Boring Log
Laboratory Curves
Sample Photographs

Boring Designation CB-JHPM09-2

DRILLING LOG		DIVISION South Atlantic		INSTALLATION Jacksonville District			SHEET 1 OF 2 SHEETS		
1. PROJECT Jacksonville Harbor General Reevaluation Report (GRR) ST. JOHN'S RIVER CHANNEL				9. SIZE AND TYPE OF BIT See Remarks					
2. BORING DESIGNATION CB-JHPM09-2				10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83		VERTICAL MLLW	
3. DRILLING AGENCY Challenge Engineering & Testing, Inc.				11. MANUFACTURER'S DESIGNATION OF DRILL Diedrich D-50 Truckrig		<input type="checkbox"/> AUTO HAMMER <input checked="" type="checkbox"/> MANUAL HAMMER			
4. NAME OF DRILLER Tim Clarkson				12. TOTAL SAMPLES		DISTURBED 10		UNDISTURBED (UD) 0	
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED				13. TOTAL NUMBER CORE BOXES 0					
6. THICKNESS OF OVERBURDEN N/A				14. ELEVATION GROUND WATER TIDAL					
7. DEPTH DRILLED INTO ROCK N/A				15. DATE BORING		STARTED 01-29-10		COMPLETED 01-29-10	
8. TOTAL DEPTH OF BORING 22.2 Ft.				16. ELEVATION TOP OF BORING -41.4 Ft.					
				17. TOTAL RECOVERY FOR BORING 67 %					
				18. SIGNATURE AND TITLE OF INSPECTOR V. J. Thompson III, Civil Engineer					
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/0.5 FT.	N-VALUE
-41.4	0.0		SAND, silty, mostly angular to subangular fine to medium-grained sand-sized quartz, few angular to subangular shell up to 1/8", wet, 5Y 4/3 olive (SM)	47	1		-41.4	3	0
							SPT Sampler	3	5
							-42.9	2	
-43.7	2.3		SAND, poorly-graded, mostly angular to subangular fine to medium-grained sand-sized quartz, wet, 10Y 7/1 light greenish gray (SP)	87	2		SPT Sampler	3	10
							-44.4	5	
							SPT Sampler	3	6
							-45.9	3	
-45.9	4.5		SAND, silty, mostly angular to subangular fine to medium-grained sand-sized quartz, moist, weak cementation, 5Y 6/2 light olive gray (SM)	86	4		SPT Sampler	5	5
-46.6	5.2		LIMESTONE, sandy, sparsely fossiliferous, moderately hard, slightly weathered, fine grained, thick bedding, bedding orientation, pitted, 5Y 8/2 pale yellow	72	Run # 1	RQD 50	4 x 5-1/2" Diamond Impregnated Bit DT = 5 mins HP = 300 psi DFR = 25 %	50/0.2'	
							-51.6		10
-51.8	10.4		LIMESTONE, non-fossiliferous, hard, solid						
-53.4	12.0		LIMESTONE, soft, highly weathered, 5Y 7/2 light gray	50	Run # 2	RQD 28	4 x 5-1/2" Diamond Impregnated Bit DT = 3 mins HP = 300 psi DFR = 25 %		

Boring Designation CB-JHPM09-2

DRILLING LOG (Cont. Sheet)			INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS									
PROJECT Jacksonville Harbor General Reevaluation Report (GRR)			COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83	VERTICAL MLLW									
LOCATION COORDINATES X = 473,752 Y = 2,207,242			ELEVATION TOP OF BORING -41.4 Ft.												
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/0.5 FT.	N-VALUE						
-60.4	19.0	 Highly Weathered	At El. -57.6 Ft., very soft	50	Run # 2	RQD 28	4 x 5-1/2" Diamond Impregnated Bit DT = 3 mins HP = 300 psi DFR = 25 %	5	15						
				73	5		SPT Sampler	14	28						
							-59.1	14							
				40	6		SPT Sampler	15	39						
							-60.6	24							
			SAND, silty, mostly angular to subangular fine to medium-grained sand-sized quartz, few subangular shell up to 1/8", moist, weak cementation, 5Y 7/2 light gray (SM) At El. -61.4 Ft., moderate cementation At El. -62.1 Ft., no cementation	73	7		SPT Sampler	3	20						
							-62.1	2							
				100	8		SPT Sampler	10	21						
-63.6	22.2						-63.6	11							
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Set 54.5 ft. of 6" flush joint steel casing 4. Water depth recorded at start of drilling operations and referenced to the tidal station at the Dames Point Bridge. 5. Water depth of -41.4 ft. recorded at 13:19 PM on 1/29/2010. Tide gage reading of +0.0 ft. mllw 6. Compressive Strength Test of Rock Core At Elevation -46.6' to -47.4' = 140 PSI. 7. Compressive Strength Test of Rock Core At Elevation -52.0' to -52.7' = 5728 PSI. 8. Laboratory Testing Results <table border="1"> <thead> <tr> <th>SAMPLE ID</th> <th>SAMPLE DEPTH</th> <th>LABORATORY CLASSIFICATION</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>4.5/5.2</td> <td>SM*</td> </tr> </tbody> </table> *Lab visual classification based on gradation curve. No Atterberg limits.	SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION	4	4.5/5.2	SM*				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.). Abbreviations: DT = Drill Time. HP = Hydraulic Pressure. DFR = Drill Fluid Return.		25
SAMPLE ID	SAMPLE DEPTH	LABORATORY CLASSIFICATION													
4	4.5/5.2	SM*													



JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 0.0'-1.5'

S-1

JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 1.5' - 3.0'

S-2

JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 3.0'-4.5'

S-3

JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 4.5-5.2'

S-4

JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 5.2' 10.2'

S- Run #1

5.2'



10.2'



JACKSONVILLE HARBOR GRR
CB-JHPM09-2

DEPTH: **10.2 - 16.2'**

S- Run #2

10.2'



16.2'



JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 16.2'-17.7'

S-5

JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 17.7'-19.2'

S-6

JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 19.2'-20.7'

S-7

EXPO

JACKSONVILLE HARBOR GRR

CB-JHPM09-2

DEPTH: 20.7' - 22.2'

S-8

TEST CORE BORING NUMBER
“CB-JHPM09-3”

gINT Boring Log
Laboratory Curves
Sample Photographs

Boring Designation CB-JHPM09-3

DRILLING LOG		DIVISION South Atlantic		INSTALLATION Jacksonville District		SHEET 1 OF 2 SHEETS	
1. PROJECT Jacksonville Harbor General Reevaluation Report (GRR) ST. JOHN'S RIVER CHANNEL				9. SIZE AND TYPE OF BIT See Remarks			
2. BORING DESIGNATION CB-JHPM09-3		LOCATION COORDINATES X = 475,095 Y = 2,205,811		10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83 VERTICAL MLLW	
3. DRILLING AGENCY Challenge Engineering & Testing, Inc.		CONTRACTOR FILE NO. 2009D08		11. MANUFACTURER'S DESIGNATION OF DRILL Diedrich D-50 Truckrig		<input type="checkbox"/> AUTO HAMMER <input checked="" type="checkbox"/> MANUAL HAMMER	
4. NAME OF DRILLER Tim Clarkson				12. TOTAL SAMPLES		DISTURBED 12 UNDISTURBED (UD) 0	
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED				13. TOTAL NUMBER CORE BOXES 0		14. ELEVATION GROUND WATER TIDAL	
6. THICKNESS OF OVERBURDEN N/A				15. DATE BORING		STARTED 01-28-10 COMPLETED 01-28-10	
7. DEPTH DRILLED INTO ROCK N/A				16. ELEVATION TOP OF BORING -39.1 Ft.		17. TOTAL RECOVERY FOR BORING 68 %	
8. TOTAL DEPTH OF BORING 23.5 Ft.				18. SIGNATURE AND TITLE OF INSPECTOR V. J. Thompson III, Civil Engineer			

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/0.5 FT.	N-VALUE
-39.1	0.0		SAND, silty, mostly angular to subangular fine-grained sand-sized quartz, some silt, trace angular to subangular shell up to 1/4", wet, 5Y 2.5/1 black (SM)	40	1		-39.1	0	0
			At El. -40.6 Ft., little silt	47	2		-40.6	0	0
			At El. -42.1 Ft., discontinue shell	67	3		-42.1	0	0
-43.6	4.5		SAND, clayey, low plasticity, soft, mostly angular to subangular fine-grained sand-sized quartz, little clay, wet, 10Y 3/1 very dark greenish gray (SC)	80	4		-43.6	2	5
-45.1	6.0		SAND, silty, mostly angular to subangular fine-grained sand-sized quartz, little silt, wet, organic odor, 5Y 3/2 dark olive gray (SM)	80	5		-45.1	3	7
-46.6	7.5		SAND, poorly-graded, mostly angular to subangular fine-grained sand-sized quartz, wet, 5Y 5/2 olive gray (SP)	67	6		-46.6	1	2
			At El. -48.1 Ft., trace rounded fine gravel-sized quartz up to 1/4", 5Y 6/1 gray	67	7		-48.1	2	3
-49.6	10.5		SAND, poorly-graded with silt, mostly angular to subangular medium to coarse-grained sand-sized quartz, few silt, trace rounded fine gravel-sized quartz up to 1/4", moist, 10BG 3/1 very dark greenish gray (SP-SM)	53	8		-49.6	3	7
-51.1	12.0		SILT, inorganic-L, nonplastic, firm, trace angular to subangular fine-grained sand-sized quartz, moist, 10BG 3/1 very dark greenish gray (ML)	67	9		-51.1	2	4
-51.6	12.5		LIMESTONE, sandy, non-fossiliferous, soft, moderately weathered, fine grained, medium bedding, bedding orientation, solid, 5Y 8/1 white	0	10		-51.6	2	5
-52.6	13.5		LIMESTONE, very hard, slightly weathered,	66	Run # 1	RQD 0	-52.6	3	50/0.0
							4 x 5-1/2" Diamond Impregnated Bit DT = 7 mins HP = 300 psi DFR = 0 %		

Boring Designation CB-JHPM09-3

DRILLING LOG (Cont. Sheet)			INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS			
PROJECT Jacksonville Harbor General Reevaluation Report (GRR)			COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83	VERTICAL MLLW			
LOCATION COORDINATES X = 475,095 Y = 2,205,811			ELEVATION TOP OF BORING -39.1 Ft.						
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-54.6	15.5	<p>Slightly Weathered</p>	solid						
			LIMESTONE, soft, pitted, clay filled pits	66	Run # 1	RQD 0	4 x 5-1/2" Diamond Impregnated Bit DT = 7 mins HP = 300 psi DFR = 0 %		
			At El. -57.6 Ft., fossiliferous, moderately hard, fine grained, pitted				-57.6		
				82	Run # 2	RQD 12	4 x 5-1/2" Diamond Impregnated Bit DT = 7 mins HP = 300 psi DFR = 0 %		
-61.6	22.5		LIMESTONE, hard, solid						
-62.6	23.5						-62.6		
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Set 50.5 ft. of 6" flush joint steel casing. 4. Water depth recorded at start of drilling operations and referenced to the tidal station at the Dames Point Bridge. 5. Water depth of -40.0 ft. recorded at 11:25 AM on 1/28/2010. Tide gage reading of +0.9 ft. mllw				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.). Abbreviations: DT = Drill Time. HP = Hydraulic Pressure. DFR = Drill Fluid Return.		

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 0.0'-1.5'

S-1

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 15'-30'

S-2

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 3.0'-4.5'

S-3

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 4.5' - 6.0'

S-4

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 6.0'-7.5'

S-5

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 7.5' 9.0'

S-6

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 9.0'-10.5'

S-7

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 10.5'-12.0'

S-8

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 12.0'-13.5'

S-9

EXPO

JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 13.5'-18.5'

S- Run #1

13.5



18.5'



JACKSONVILLE HARBOR GRR

CB-JHPM09-3

DEPTH: 18.5'-23.5'

S- Run #2

18.5'



23.5'



TEST CORE BORING NUMBER
“CB-JHPM09-4”

gINT Boring Log
Laboratory Curves
Sample Photographs

Boring Designation CB-JHPM09-4

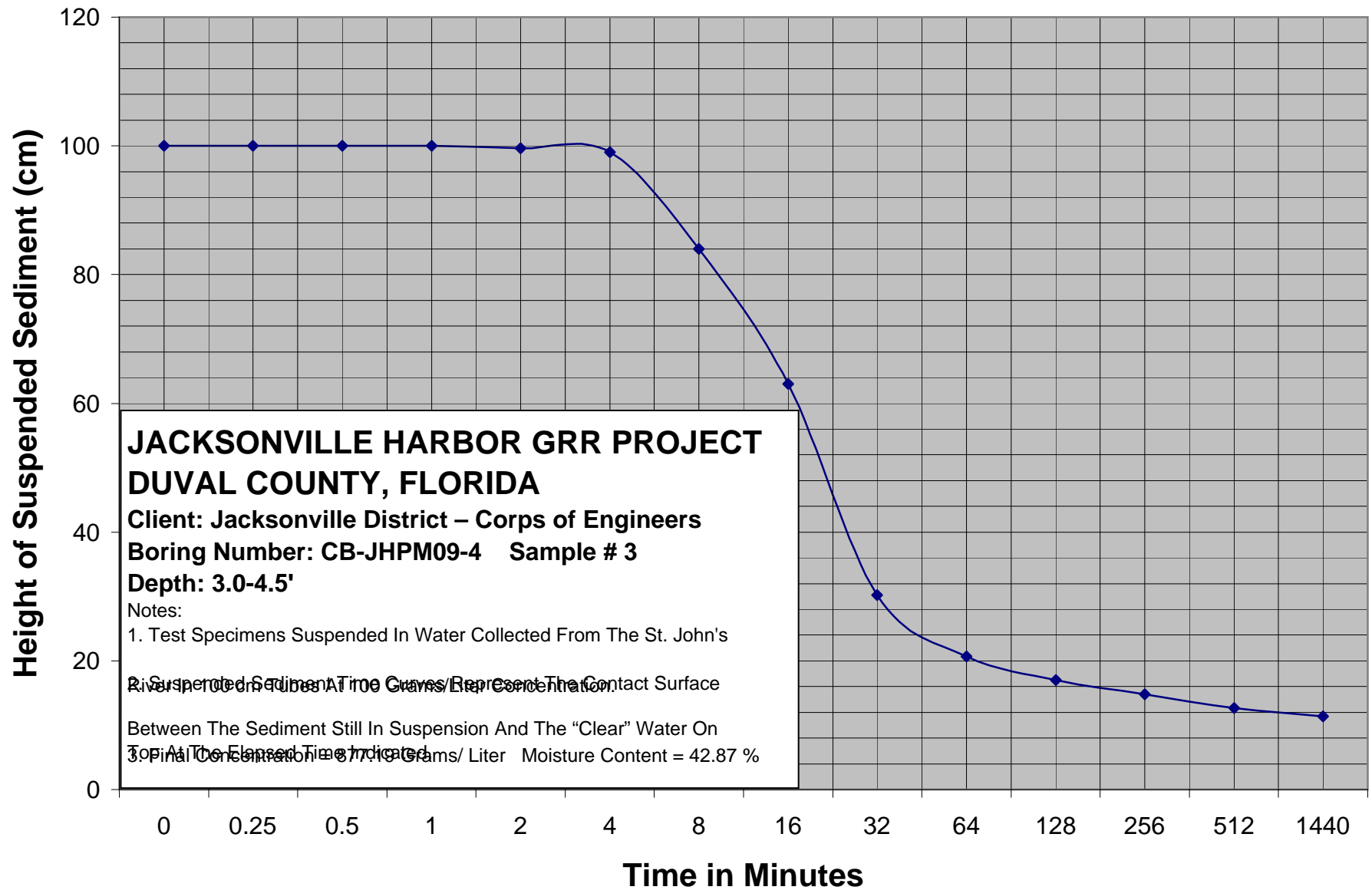
DRILLING LOG		DIVISION South Atlantic		INSTALLATION Jacksonville District			SHEET 1 OF 2 SHEETS	
1. PROJECT Jacksonville Harbor General Reevaluation Report (GRR) ST. JOHN'S RIVER CHANNEL				9. SIZE AND TYPE OF BIT See Remarks				
2. BORING DESIGNATION CB-JHPM09-4				10. COORDINATE SYSTEM/DATUM HORIZONTAL VERTICAL State Plane, FLE (U.S. Ft.) NAD83 MLLW				
3. DRILLING AGENCY Challenge Engineering & Testing, Inc.				11. MANUFACTURER'S DESIGNATION OF DRILL <input type="checkbox"/> AUTO HAMMER Diedrich D-50 Truckrig <input checked="" type="checkbox"/> MANUAL HAMMER				
4. NAME OF DRILLER Tim Clarkson				12. TOTAL SAMPLES DISTURBED UNDISTURBED (UD) 15 0				
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL DEG. FROM VERTICAL BEARING <input type="checkbox"/> INCLINED				13. TOTAL NUMBER CORE BOXES 1				
6. THICKNESS OF OVERBURDEN N/A				14. ELEVATION GROUND WATER TIDAL				
7. DEPTH DRILLED INTO ROCK N/A				15. DATE BORING STARTED COMPLETED 01-28-10 01-28-10				
8. TOTAL DEPTH OF BORING 22.5 Ft.				16. ELEVATION TOP OF BORING -41.0 Ft.				
				17. TOTAL RECOVERY FOR BORING 82 %				
				18. SIGNATURE AND TITLE OF INSPECTOR V. J. Thompson III, Civil Engineer				

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/0.5 FT.	N-VALUE
-41.0	0.0						-41.0		
			SILT, organic-L, nonplastic, very soft, wet, 5Y 2.5/1 black (OL)	40	1		SPT Sampler	0	
-42.5	1.5						-42.5	0	
			SAND, silty, mostly angular to subangular fine to medium-grained sand-sized quartz, little silt, wet, 5Y 2.5/1 black (SM)	60	2		SPT Sampler	0	
				60	3		SPT Sampler	0	
			At El. -46.0 Ft., 5Y 4/2 olive gray	80	4		SPT Sampler	0	
-47.0	6.0						-47.0	3	
			SILT, inorganic-L, nonplastic, hard, few angular to subangular fine-grained sand-sized quartz, moist, 10G 2.5/1 greenish black (ML)	100	5		SPT Sampler	3	
				100	6		SPT Sampler	4	
			At El. -50.0 Ft., some angular to subangular fine-grained sand-sized quartz, 10Y 4/1 dark greenish gray	93	7		SPT Sampler	5	
				100	8		SPT Sampler	3	
				93	9		SPT Sampler	4	
-54.5	13.5						-54.5	6	
			SAND, silty, mostly angular to subangular fine-grained sand-sized quartz, some silt, moist, 10Y 3/1 very dark greenish gray (SM)	100	10		SPT Sampler	3	
							-56.0	6	

Boring Designation CB-JHPM09-4

DRILLING LOG (Cont. Sheet)			INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS			
PROJECT Jacksonville Harbor General Reevaluation Report (GRR)			COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83	VERTICAL MLLW			
LOCATION COORDINATES X = 476,063 Y = 2,203,939			ELEVATION TOP OF BORING -41.0 Ft.						
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	ROD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-57.5	16.5		At El. -56.0 Ft., 10Y 4/1 dark greenish gray	67	11		SPT Sampler	7 13 15	28
			SAND, poorly-graded with silt, mostly angular to subangular fine to medium-grained sand-sized quartz, trace silt, trace angular to subangular shell up to 1-1/2", moist, 5Y 5/2 olive gray (SP-SM) At El. -59.0 Ft., discontinue shell, 5Y 4/2 olive gray	73	12		SPT Sampler	11 18 14	32
				93	13		SPT Sampler	13 16 19	35
				80	14		SPT Sampler	4 15 17	32
				87	15		SPT Sampler	17 28 30	58
-63.5	22.5								
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Set 55.5 ft. of 6" flush joint steel casing 4. Water depth recorded at start of drilling operations and referenced to the tidal station at the Dames Point Bridge. 5. Water depth of -44.3 ft. recorded at 08:00 AM on 1/28/2010. Tide gage reading of +3.3 ft. mllw				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.).		

SUSPENDED SEDIMENTATION TIME CURVES



JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 0.0' - 1.5'

S-1

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 1.5' - 3.0'

S-2

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 3.0-4.5'

S- 3

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 4.5-6.0'

S-4

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 6.0'-7.5'

S-5

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 7.5' 9.0'

S-6

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 9.0' - 10.5'

S-7

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 10.5' - 12.0'

S-8

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 12.0'-13.5'

S-9

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 13.5' - 15.0'

S-10

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 15.0' - 16.5'

S-11

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 16.5' - 18.0'

S-12

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 18.0'-19.5'

S-13

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 19.5' - 21.0'

S-14

JACKSONVILLE HARBOR GRR

CB-JHPM09-4

DEPTH: 21.0'-22.5'

S-15

TEST CORE BORING NUMBER
“CB-JHPM09-5”

gINT Boring Log
Laboratory Curves
Sample Photographs

Boring Designation CB-JHPM09-5

DRILLING LOG		DIVISION South Atlantic		INSTALLATION Jacksonville District			SHEET 1 OF 2 SHEETS		
1. PROJECT Jacksonville Harbor General Reevaluation Report (GRR) ST. JOHN'S RIVER CHANNEL				9. SIZE AND TYPE OF BIT See Remarks					
2. BORING DESIGNATION CB-JHPM09-5				10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83		VERTICAL MLLW	
3. DRILLING AGENCY Challenge Engineering & Testing, Inc.				11. MANUFACTURER'S DESIGNATION OF DRILL Diedrich D-50 Truckrig		<input type="checkbox"/> AUTO HAMMER <input checked="" type="checkbox"/> MANUAL HAMMER			
4. NAME OF DRILLER Tim Clarkson				12. TOTAL SAMPLES		DISTURBED 12		UNDISTURBED (UD) 0	
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED				13. TOTAL NUMBER CORE BOXES 0					
6. THICKNESS OF OVERBURDEN N/A				14. ELEVATION GROUND WATER TIDAL					
7. DEPTH DRILLED INTO ROCK N/A				15. DATE BORING		STARTED 01-27-10		COMPLETED 01-27-10	
8. TOTAL DEPTH OF BORING 20.3 Ft.				16. ELEVATION TOP OF BORING -43.4 Ft.					
				17. TOTAL RECOVERY FOR BORING 86 %					
				18. SIGNATURE AND TITLE OF INSPECTOR V. J. Thompson III, Civil Engineer					
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-43.4	0.0						-43.4		
			SILT, organic-L, nonplastic, very soft, few angular to subangular fine-grained sand-sized quartz, trace angular to subangular shell up to 1/4", wet, 5Y 2.5/1 black (OL)	60	1		SPT Sampler	0	0
-44.9	1.5						-44.9	0	
			LIMESTONE, sandy, sparsely fossiliferous, very soft, highly weathered, fine grained, wet, 5Y 8/2 pale yellow	53	2		SPT Sampler	8	10
							-46.4	6	
				87	3		SPT Sampler	4	27
							-47.9	12	
				80	4		SPT Sampler	15	30
							-49.4	15	
				93	5		SPT Sampler	7	23
							-50.9	9	
				100	6		SPT Sampler	14	42
							-52.4	18	
				100	7		SPT Sampler	21	27
							-53.9	12	
				100	8		SPT Sampler	8	19
							-55.4	7	
				100	9		SPT Sampler	5	23
							-56.9	9	
				100	10		SPT Sampler	14	55
							-58.4	15	

Boring Designation CB-JHPM09-5

DRILLING LOG (Cont. Sheet)			INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS			
PROJECT Jacksonville Harbor General Reevaluation Report (GRR)			COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83	VERTICAL MLLW			
LOCATION COORDINATES X = 477,878 Y = 2,202,250			ELEVATION TOP OF BORING -43.4 Ft.						
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-58.7	15.3	 Slightly Weathered	LIMESTONE, sandy, sparsely fossiliferous, moderately hard, slightly weathered, fine grained, massive bedding, bedding orientation, pitted, 5Y 6/2 light olive gray	100	11		-58.7 SPT Sampler	50/0.3'	15
				80	Run # 1	RQD 61	4 x 5-1/2" Diamond Impregnated Bit DT = 3 mins HP = 300 psi DFR = 25 %		
-63.7	20.3						-63.7		20
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Set 52.5 ft. of 6" flush joint steel casing 4. Water depth recorded at start of drilling operations and referenced to the tidal station at the Dames Point Bridge. 5. Water depth of -43.7 ft. recorded at 11:47 AM on 1/27/2010. Tide gage reading of +0.3 ft. mllw. 6. Compressive Strength Test of Rock Core At Elevation -59.2' to -59.9' = 306 PSI.				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.). Abbreviations: DT = Drill Time. HP = Hydraulic Pressure. DFR = Drill Fluid Return.		25
									30
									35

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 0.0'-1.5'

S-1

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 1.5' 3.0'

S-2

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 3.0'-4.5'

S-3

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 4.5'-6.0'

S-4

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 6.0'-7.5'

S-5

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 7.5' 9.0'

S-6

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 9.0'-10.5'

S-7

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 10.5' - 12.0'

S-8

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 12.0'-13.5'

S-9

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 13.5-15.0'

S-10

JACKSONVILLE HARBOR GRR

CB-JHPM09-5

DEPTH: 15.0'-15.3'

S-11

JACKSONVILLE HARBOR GRR
CB-JHPM09-5

DEPTH: 15.3'-20.3'

S-Run #1

15.3'



20.3'

Bottom



TEST CORE BORING NUMBER
“CB-JHPM09-6”

gINT Boring Log
Laboratory Curves
Sample Photographs

Boring Designation CB-JHPM09-6

DRILLING LOG		DIVISION South Atlantic		INSTALLATION Jacksonville District			SHEET 1 OF 2 SHEETS		
1. PROJECT Jacksonville Harbor General Reevaluation Report (GRR) ST. JOHN'S RIVER CHANNEL				9. SIZE AND TYPE OF BIT See Remarks					
2. BORING DESIGNATION CB-JHPM09-6				10. COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83		VERTICAL MLLW	
3. DRILLING AGENCY Challenge Engineering & Testing, Inc.				11. MANUFACTURER'S DESIGNATION OF DRILL Diedrich D-50 Truckrig		<input type="checkbox"/> AUTO HAMMER <input checked="" type="checkbox"/> MANUAL HAMMER			
4. NAME OF DRILLER Tim Clarkson				12. TOTAL SAMPLES		DISTURBED 5		UNDISTURBED (UD) 0	
5. DIRECTION OF BORING <input checked="" type="checkbox"/> VERTICAL <input type="checkbox"/> INCLINED				13. TOTAL NUMBER CORE BOXES 0					
6. THICKNESS OF OVERBURDEN N/A				14. ELEVATION GROUND WATER TIDAL					
7. DEPTH DRILLED INTO ROCK N/A				15. DATE BORING		STARTED 01-27-10		COMPLETED 01-27-10	
8. TOTAL DEPTH OF BORING 18.8 Ft.				16. ELEVATION TOP OF BORING -45.0 Ft.					
				17. TOTAL RECOVERY FOR BORING 79 %					
				18. SIGNATURE AND TITLE OF INSPECTOR V. J. Thompson III, Civil Engineer					
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/0.5 FT.	N-VALUE
-45.0	0.0						-45.0		
-45.3	0.3		SAND, silty, mostly fine to medium-grained sand-sized quartz, little subangular shell up to 1/2", wet, 5Y 3/2 dark olive gray (SM)	40	1		SPT Sampler	0	
			LIMESTONE, sandy, non-fossiliferous, very soft, highly weathered, fine grained, wet, 5Y 8/1 white					1	
			At El. -47.0 Ft., sparsely fossiliferous, moderately hard, slightly weathered, fine grained, massive bedding, bedding orientation, pitted, shelly sand filled pits, 5Y 6/2 light olive gray	94	2		SPT Sampler	1	
			At El. -48.0 Ft., very soft, highly weathered, moist					0	
								50/0.3'	
			At El. -50.3 Ft., non-fossiliferous, moderately hard, slightly weathered, fine grained, solid	54	Run # 1	RQD 25	4 x 5-1/2" Diamond Impregnated Bit DT = 2 mins HP = 300 psi DFR = 25 %		
			At El. -52.8 Ft., fossiliferous, soft, moderately weathered, fine grained, pitted, shelly sand filled pits						
			At El. -54.6 Ft., moderately hard, slightly weathered	100	Run # 2	RQD 41	4 x 5-1/2" Diamond Impregnated Bit DT = 1 mins HP = 300 psi DFR = 25 %		
				91	Run # 3	RQD 27	4 x 5-1/2" Diamond Impregnated Bit DT = 2 mins HP = 300 psi DFR = 25 %		

Boring Designation CB-JHPM09-6

DRILLING LOG (Cont. Sheet)			INSTALLATION Jacksonville District			SHEET 2 OF 2 SHEETS			
PROJECT Jacksonville Harbor General Reevaluation Report (GRR)			COORDINATE SYSTEM/DATUM State Plane, FLE (U.S. Ft.)		HORIZONTAL NAD83	VERTICAL MLLW			
LOCATION COORDINATES X = 479,149 Y = 2,201,007			ELEVATION TOP OF BORING -45.0 Ft.						
ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS	% REC.	BOX OR SAMPLE	RQD OR UD	REMARKS	BLOWS/ 0.5 FT.	N-VALUE
-63.8	18.8	Slightly Weathered ↓	At El. -60.0 Ft., porous, sand filled pores At El. -63.0 Ft., porous, clay filled pores	91	Run # 3	RQD 27	4 x 5-1/2" Diamond Impregnated Bit DT = 2 mins HP = 300 psi DFR = 25 %		
			NOTES: 1. USACE Jacksonville is the custodian for these original files. 2. Soils are field visually classified in accordance with the Unified Soils Classification System. 3. Set 54.5 ft. of 6" flush joint steel casing 4. Water depth recorded at start of drilling operations and referenced to the tidal station at the Dames Point Bridge. 5. Water depth of -47.7 ft. recorded at 08:10 AM on 1/27/2010. Tide gage reading of +2.7 ft. mllw 6. Compressive Strength Test of Rock Core At Elevation -49.0' to -49.5' = 398 PSI.				140# hammer w/30" drop used with 2.0' split spoon (1-3/8" I.D. x 2" O.D.). Abbreviations: DT = Drill Time. HP = Hydraulic Pressure. DFR = Drill Fluid Return.		

JACKSONVILLE HARBOR GRR

CB-JHPM09-6

DEPTH: 0.0-1.5'

S-1

JACKSONVILLE HARBOR GRR

CB-JHPM09-6

DEPTH: 1.5'-2.3'

S-2

JACKSONVILLE HARBOR GRR

CB-JHPM09-6

DEPTH: 2.3 - 7.8'

S-Run #1

2.3'



7.8'



JACKSONVILLE HARBOR GRR
CB-JHPM09-6

DEPTH: 7.8'-13.3'

S- Run #2

7.8'



13.3'



JACKSONVILLE HARBOR GRR

CB-JHPM09-6

DEPTH: 13.3'-18.8'

S-Run #3

13.3'



18.8'



BOTT